

REMARKS

I. Drawing Corrections

The drawing was objected to under 37 C.F.R. 1.83 (a) for failing to show each and every feature of the claimed invention in the previous Office Action dated April 13, 2005. The "parabolic collector" was not illustrated in the original drawing figures.

A figure 4 was filed with the amendment dated June 17, 2005 to correct this deficiency, but this new figure was not in compliance with 37 C.F.R. 1.121 (d) because it was not correctly labeled. Another copy of this new figure correctly labeled "new sheet" in accord with 37 C.F.R. 1.121 (d) accompanies and/or is attached to this amendment. The figure captions in the specification have already been appropriately amended.

This new figure 4 correctly shows the parabolic collector according to the invention including the absorber pipe according to the invention as described in the specification. Thus the new figure 4 should overcome the previous objection to the drawing.

For the foregoing reasons, withdrawal of the objection to the form of the replacement drawing sheet with the new figure 4 under 37 C.F.R. 1.121 (d) is respectfully requested.

II. Allowable Subject Matter

Claims 46, 47, 59 and 60 were found to contain allowable subject matter and would be allowed if all the limitations of the base and intervening claims were included in them by amendment. Applicants gratefully acknowledge the indication of allowable subject matter but have chosen to amend the claims somewhat differently to overcome the anticipation and obviousness rejections.

III. Anticipation Rejections

Claims 39 to 42, 50 and 65 were rejected under 35 U.S.C. 102 (b) as anticipated by JP55-14455 OR as anticipated by U.S. Patent 4,231,353.

Independent claims 39, 52 and 65 have been amended to distinguish their subject matter patentably from the JP55-14455 or Kanatani, et al.

The rebuttal arguments on page 2 and 3 of the Office Action have been carefully considered. In order to completely distinguish the invention claimed in independent claim 39 from Kanatani, et al, or JP55-14455 applicants have included the limitation that the outer end of the bellows is outside of the annular space 4 in the fourth to last paragraph of claim 39. This change is, of course, supported by the applicants' disclosure at page 8, lines 8 to 14, as explained on page 2 of the Office Action.

This added limitation in claim 39 distinguishes the claimed absorber pipe

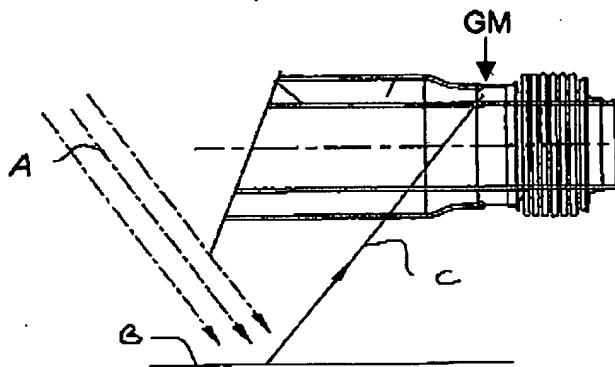
from the embodiment of the absorber pipe end structure shown in figure 1 of JP 55-14455, in which the flexible diaphragm 9 is shown as being inside of the annular spaced between the glass tube 1 and the central metal pipe 2. In fact, the added limitation is the opposite from the structure shown in the JP reference if the folding bellows 11 of applicants' claim 39 is considered equivalent to the flexible diaphragm 9.

Similarly the expandable portion 15 in the end plate 12 shown in the embodiment of fig. 6 in U.S. Patent 4,231,353 is also inside the space between the outer member 9 and the central metal pipe. Furthermore claim 1 of U.S. '353 states that "at least a portion of each end plate disposed inwardly of its periphery being resilient" and claim 2 states that the "expandable portion" 15 is "adjacent to and interior of" each of the annular grooves in the periphery of the end plate. From these features in the claims of U.S. '353 one would conclude that the "expandable portion" is arranged interiorly of the annular grooves and thus the edge of the glass tubular member. This is the opposite from the structure claimed in claim 39 if the folding bellows 11 of applicants' claim 39 is considered equivalent to the "expandable portion" 15.

Thus the argument on page 22, first full paragraph, of the amendment dated June 20, 2005 should be given full credit and the anticipation rejection should be withdrawn. Since the limitation that the outer end must be outside of the annular space 4 has now been included in claim 39 and since Kanatani or the JP reference teaches the opposite from this feature, claim 39 should no longer be rejected as anticipated by Kanatani, et al, or the JP reference.

Furthermore the fact that the outer end of the bellows extends to the outside of the annular space helps to attain the principle object of the present invention, namely the increase of the service life of the absorber tube. As explained on page 7, starting line 10 and following of the applicant's specification the principle cause for breakdown of the absorber pipe is heating and breakage of the glass-metal transitional element. Of course end caps or other means can be used to protect the glass-metal transitional element from radiation falling directly on it.

However in a solar heating assembly using a known structure for the absorber tube significant heating and breakdown of glass-metal transitional elements can be caused by reflected radiation from the reflector B that focuses radiation on the absorber pipe when the sun is in a position that is low with respect to the horizon. The following figure shows that the glass-metal transitional element GM can be reached by solar radiation A, which is reflected by the reflector B to produce a ray or rays C, which enters the absorber pipe at an obtuse angle and reaches the glass-metal transitional element GM.



The absorber pipe structure claimed in claim 39 addresses the problems

due to heating of the glass-metal transitional element by radiation entering the absorber pipe at an oblique angle. The fact that the bellows 11 extends beyond the free end of the sleeve tube 2 provides additional blocking of this sort of radiation from the reflector and thus prevents it from reaching and heating the glass-metal transitional element. Coupled with features from the dependent claims this sort of radiation, which enters the absorber tube in the vicinity of the middle at an oblique angle, can be completely blocked without impairing the efficiency and collecting ability of the absorber tube.

The critical features are expressed in the next to last paragraph of claim 39, which reads:

"wherein said folding bellows (11) and said connecting element (15, 15', 15") extend sufficiently into the annular space (4) and between the glass sleeve tube (2) and the central metal pipe (3), so that said glass-metal transitional element (5) is protected from radiation which would otherwise reach the glass-metal transitional element (5) after entering the glass sleeve tube (2)".

This paragraph defines the longitudinal and lateral dimensions of the bellows 11 and connecting element 15 with functional wording. The functional wording limits these dimensions to those that result in blocking of radiation that enters the central portion of the absorber pipe and would otherwise reach the glass-metal transitional element and thus heat it and shorten the service life of the absorber tube. Of course the type and source of this damaging reflected radiation were only incompletely explained in the applicants' specification.

The fact that the outer end of the bellows extends outside of annular

space 4 beyond the end of the sleeve tube 2 and between the glass-metal transitional element and the central metal pipe (also in claim 39) provides additional protection of the glass-metal transitional element from the reflected radiation of this type.

In contrast, the embodiment, e.g. fig. 6 of US 4,231,353, of the absorber pipe of Kanatani, et al, mentioned in the Office Action provides no protection or very little protection of the transitional region between the outer member 9 and the end gap, which is filled with the plumbic oxide glass joining material. This sort of joint must also be subject to thermal stresses during heating due to differences in thermal expansion coefficients and thus similar problems. No protection is provided by this structure from radiation that enters the center of the absorber tube of Kanatani, et al, at an angle and impinges on the transitional region.

It is well established that each and every limitation of a claimed invention must be disclosed in a single prior art reference in order to be able to reject the claimed invention under 35 U.S.C. 102 (b) based on the disclosures in the single prior art reference. See M.P.E.P. 2131 and also the opinion in *In re Bond*, 15 U.S.P.Q. 2nd 1566 (Fed. Cir. 1990).

First, neither Kanatani, et al, nor JP55-14455 teach that the folding bellows or its equivalent in their embodiments of the end cap for the absorber pipe extends outside of the annular space between the outer member or sleeve tube and the central metal pipe. In contrast the amended claim 39 does now include that additional limitation.

Second, neither Kanatani, et al, nor JP55-14455 teach that the folding

bellows and the connecting element have lateral and longitudinal dimensions ("extends sufficiently into the annular space (4)" is the exact wording in claim 39) so that the damaging reflected radiation entering the absorber pipe does not reach the glass-metal transitional element. The wording "extends sufficiently into" does not specify whether a lateral or longitudinal extending is involved so that one interprets this broadly to mean both lateral and longitudinal extending.

Also Kanatani, et al, and JP55-14455 disclose entirely different types of bonding between the free end of the glass outer member and the metal end cap, which is not a glass-metal transitional element as now claimed in the last paragraph of the amended claim 39.

Independent claim 65 has been amended to include the same additional limitations as claim 39. Thus claim 65 and the dependent claims that depend on claim 39 should not be rejected as anticipated by the JP reference or its corresponding U.S. Patent.

For the foregoing reasons and because of the changes in claim 39, withdrawal of the rejections of claims 39 to 42, 50 and 65 under 35 U.S.C. 102 (b) as anticipated by JP55-14455 and also by U.S. Patent 4,231,353, Kanatani, et al, is respectfully requested.

Similarly claims 44, 45 and 49 were rejected additionally as anticipated by U.S. Patent 4,231,353.

Currently claims 44, 45 and 49 claim features of preferred embodiments of the absorber pipe claimed in claim 39 and are not being used to distinguish the subject matter of the claimed absorber tube from the Kanatani, et al, U. S.

Patent.

It is respectfully submitted that the anticipation rejection of claims 44, 45 and 49 should be withdrawn because these dependent claims now depend on an independent claim 39 that has been amended so that it can no longer be rejected as anticipated by the Kanatani U.S. Patent.

For the foregoing reasons withdrawal of the anticipation rejection of claims 44, 45 and 49 under 35 U.S.C. 102 (b) by the Kanatani, et al, U.S. Patent is respectfully requested.

IV. Obviousness Rejection

Claims 43, 48, 51 to 56 and 61 to 64 were rejected as obvious under 35 U.S.C. 103 (a) over JP55-14455 or US Patent 4,231,353, in view of Hayama, et al (U.S. Patent 4,133,298).

The subject matter of JP55-14455 and U.S. Patent 4,231,353 has been described above.

Hayama, et al, discloses several different embodiments of absorber pipes with different structures at their ends for connecting the glass outer tube with the central metal pipe. The embodiments of figures 9 and 13 are not relevant to the present invention because they provide no additional suggestions for protective structure for the joint between the metal end cap or the central metal pipe with the glass outer tube from damaging reflected radiation entering the absorber tube at an oblique angle.

Hayama, et al, also disclose an embodiment in figure 12, which includes an absorber pipe end structure in which expandable element 15 (like applicants' bellows) is located entirely within the annular space between the central metal pipe and the outer glass or sleeve tube 11(column 5, lines 22 to 24). Also the expandable member 15 is attached to the guide pipe 14 and central metal pipe with "wax"? It is unclear what the "wax" is in this embodiment but it is clear that the wax is not glass solder. It is also clear that the bellows is not attached to the central metal pipe by welding or some other more permanent connection method, which is encompassed by the term "glass-metal seal" as defined in the last newly added paragraph of applicant's claims 39, 52 and 65. See the disclosure in Hayama, et al, at column 4, line 67, to column 5, line 10.

There are several features of applicants' amended claims 39, 52 and 65 that are not present in the disclosure of Kanatani, et al, or JP55-14455 that are not disclosed in or would not be suggested to one skilled in the art by Hayama, et al. First, Hayama, et al, does not suggest a bellows or expandable member that has an inner end inside the annular space between the outer member and the central metal pipe and an outer end that is outside of the annular space. In the embodiments of Hayama, et al, either the bellows is entirely within the annular space or is outside the annular space. Second, there is no protection for the wax connection between the expandable member 15 and either the guide tube 14 or the central pipe 12 from reflected light that enters the middle part of the absorber tube at an oblique angle and hence these joints would easily heat up and perhaps weaken. Furthermore the reflective layers 17 actually act to retain heat

in the region of the end of the pipes. Third, there is no similar glass-metal transitional element as now defined in the paragraphs at the end of the independent claims. The only relevant embodiment of fig. 12 uses "wax" to connect the bellows to the central metal pipe.

One skilled in the art would not pick and chose features from the various embodiments of Hayama, et al, and combine them with those of the Kanatani, et al, or JP55-14455 to obtain the absorber pipe as now claimed in the applicants' amended independent claims because there is no guidance in these references regarding which of the features scattered through several embodiments one should select. Of course Hayama, et al, does disclose some features of the dependent claims, as indicated in the Office Action, such as reflective surfaces to direct radiation away from or to desired regions of the absorber pipe.

It is well established that there must be a hint or suggestion of the modifications of the disclosures of the prior art references used to reject a claimed invention under 35 U.S.C. 103 (a) for a valid 103 rejection. For example, the Federal Circuit Court of Appeals has said:

"The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification....It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that "one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." *In re Fritch*, 23 U.S.P.Q. 2nd 1780, 1783-84 (Fed. Cir. 1992).

In the case of the instant invention claimed in applicants' claim 39 and the other independent claims it is respectfully submitted that one skilled in the art would not find a hint or suggestion in Hayama, et al, to modify the structure shown in fig. 3 of the JP reference or Kanatani, et al, by including the necessary features from Hayama, et al, to obtain the invention as claimed in applicants' independent claims.

Especially Hayama, et al, do not mention the problem of protecting the transitional region between the outer glass tube and the central metal pipe from radiation that can heat the joints between dissimilar material in this transitional region by reflected radiation that enters the middle portion of the absorber tube. Thus Hayama, et al, do not recognize the service life shortening thermal stresses that can be produced and do not disclose structural means for protecting these joints as shown in the Kanatani, et al, and JP references, which will effectively avoid or greatly reduce the amount of reflected solar radiation reaching the region at which either the end cap or the glass-metal transitional element is bonded or connected with the free end of the glass sleeve tube or glass outer member.

As noted above by suitable arrangement of the bellows between the glass-metal transitional element and the central metal pipe with the bellows extending into the annular space as well as outside of it the glass-metal transitional element is appropriate protected from this radiation. Neither reference suggests the appropriate structural features in the independent claims that are necessary to provide this protection.

The features of dependent claims 43, 48, 51, 52 to 56 and 61 to 64 are not currently relied on to establish the patentability of the subject matter of the amended independent claims 39, 52 and 65. They are features of preferred embodiments.

For the foregoing reasons and because of the changes in the amended independent claims 39, 52 and 65, withdrawal of the rejection of claims 43, 48, 51 to 56 and 61 to 64 as obvious under 35 U.S.C. 103 (a) over JP55-14455 or US Patent 4,231,353, in view of Hayama, et al (U.S. Patent 4,133,298) is respectfully requested.

V. Specification

An additional spelling error was corrected on page 7 of applicants' specification.

Should the Examiner require or consider it advisable that the specification, claims and/or drawing be further amended or corrected in formal respects to put this case in condition for final allowance, then it is requested that such amendments or corrections be carried out by Examiner's Amendment and the case passed to issue. Alternatively, should the Examiner feel that a personal discussion might be helpful in advancing the case to allowance, he or she is invited to telephone the undersigned at 1-631-549 4700.

In view of the foregoing, favorable allowance is respectfully solicited.

Respectfully submitted,


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